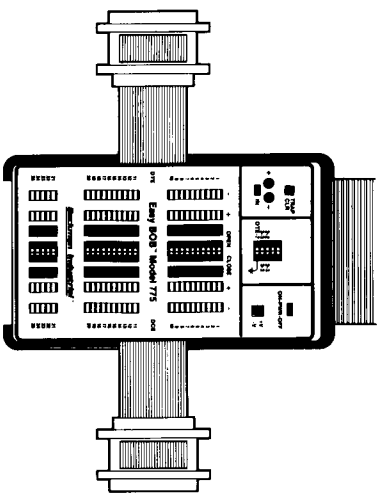
PLACE
POSTAGE
HERE

INSTRUMENTATION PRODUCTS DIVISION
BECKMAN INDUSTRIAL CORPORATION
3883 Ruffin Road
San Diego, CA 92123-1898

# Easy BOB
## MODEL 775



**Beckman Industrial™**

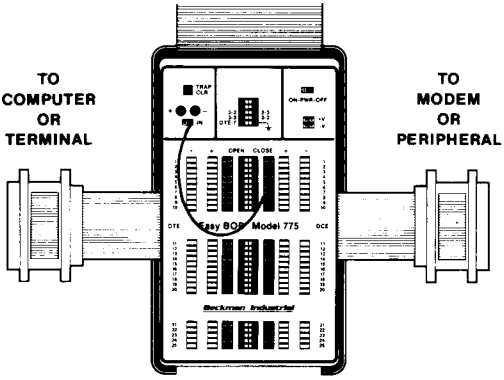
Instrumentation Products Division • Beckman Industrial Corporation • A Subsidiary of Emerson Electric Company
630 Puente Street • Brea, California 92621 • (714) 773-8111 TWX 910-592-1260 Telex 06-78413

## B. USING THE PULSE TRAP

The Pulse Trap will display positive or negative pulses. These are very short pulses (as short as 1 microsecond) that are too short for the eye to see. The Pulse Trap feature is connected to any pin using a jumper wire from the jumper terminal pin to the Pulse Trap input terminal. The power switch must be on when using the Pulse Trap. When there is a pulse the red or green LED will illuminate. The Pulse Trap LED will stay illuminated until the power is turned off or the trap clear switch is depressed.

The most common use of the Pulse Trap is to detect if pin 8, Data Carrier Detect has been dropped. Insert the Easy BOB into the data transmission line at either end by disconnecting the cable and inserting the BOB between the cable and the equipment. Have all switches in the CLOSE position so signals will flow through the Easy BOB. Install a jumper wire from pin 8 (usually the DCE side) to the Pulse Trap input terminal. Check that power is ON. If green LED illuminates, it signifies the carrier was dropped. Because of the design of Easy BOB the BOB could remain in the line overnight if needed. Battery life is over 200 hours.

Please note, all lines that have signals will remain illuminated on the BOB. Pin 8, DCD, on the faceplate would typically have a red LED on.




**PULSE TRAP**



## C. MODEM LOOP BACK TESTING

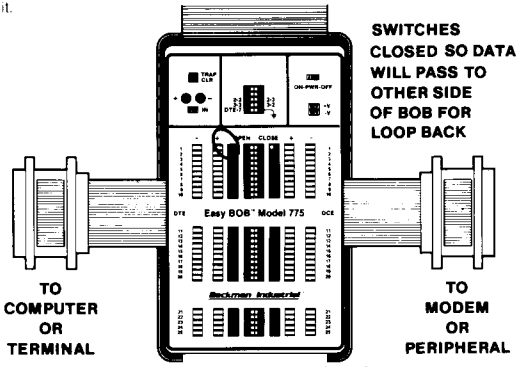
Typically data transmission is done by sending the signal from one end of the data line, it then goes through the local modem, over telephone lines, through a remote site modem and to the terminal or other equipment.

A modem loop back test usually sends out a signal at the computer end, sends it through the local and remote modem, then before it reaches the terminal loops it back to its origination point. The origination point will compare the data received to the data sent and determine the number of errors.

The Easy BOB is used at the remote modem site to loop back the data. This requires that transmit Data on pin 2, must be looped back onto pin 3, for Receive Data. The Easy BOB can do this easily by jumpering from pin 2 to pin 3. The breakout switches must be checked to assume they are in the correct position. This will depend on how the BOB is connected into the data system.

This method of testing usually requires disconnection of the terminal or computer depending on which end of the data network you are located.

Disconnecting this equipment may cause the equipment at the other end of the network to stop operating. For instance, it may be waiting for a Request-to-Send signal. If this was the situation you would need to jumper on the Easy BOB from an active signal to pin 4, Request-to-Send. Other signals may require jumpers too. Manuals should be checked. Output signals from the device should be checked before disconnecting it.




**MODEM LOOPBACK TESTING**

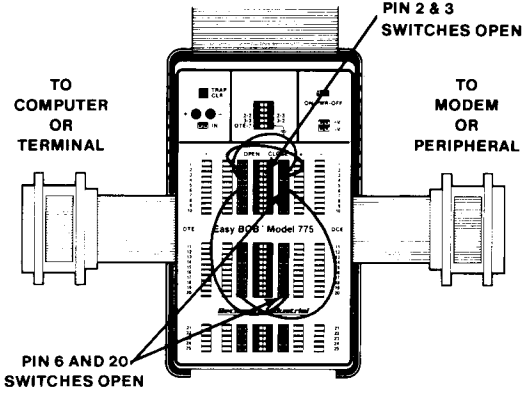
D. NON-STANDARD INTERFACES

Every pin location has a SLIDE switch for breaking the signal and jumper terminals for re-routing the signal. This allows virtually an unlimited number of interfaces. Usually, pin 1, earth ground and pin 7, signal ground, will keep those designations so the switch for these pins will remain in the closed (on) position.

A typical problem encountered is having straight through cable but a cable with the pin 2, TD, and pin 3, RD, crossover is needed. The user will want to place the Easy BOB in the data transmission line and use it to reconfigure the cable.

After placing Easy BOB in the line, open (off) the switches for pin 2 and 3. Now, the signals can not flow through Easy BOB. Place a jumper wire from DTE pin 2 to DCE pin 3. Place another jumper wire from DTE pin 3 to DCE pin 2. Now, when a signal comes into pin 2 it will be transfered to pin 3, and signals on pin 3 will be transfered to pin 2. This is commonly called the NULL MODEM interface.

Another interface might be as a modem eliminator. This interface usually requires the pin 2/pin 3 crossover described above and a crossover for pin 6, Data Set Ready and pin 20, Data Terminal Ready.




**NON-STANDARD INTERFACES**



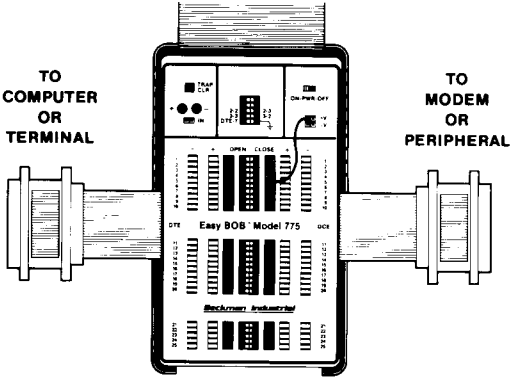
E. USING THE SPARE LED's

The 100 LED Easy BOB breakout box does not need spare LED's to monitor lines because all lines have monitoring LED's on both sides of the breakout switches.

F. SIMULATION OF SIGNALS

When testing a data transmission network it is rather common to find that a needed signal is not available. For instance, let's assume the computer sent out a Request-to-Send, pin 4, signal but it did not receive back a Clear-to-Send, pin 5, signal. Now, a signal must be simulated on pin 5 to see if the system will start to function properly. Typically, this is a positive voltage (red) signal but the manufacturers manual should be checked. Assuming it is a positive signal needed, use a jumper wire from the +V terminal, near the power switch, to the appropriate pin number jumper terminal, such as pin 5 in this example.

Please note that the terminal strip with the positive and minus voltages available is near the on/off switch. These voltages are most commonly used for signal simulation.




**SIMULATION OF SIGNALS**



G. CABLE TESTING

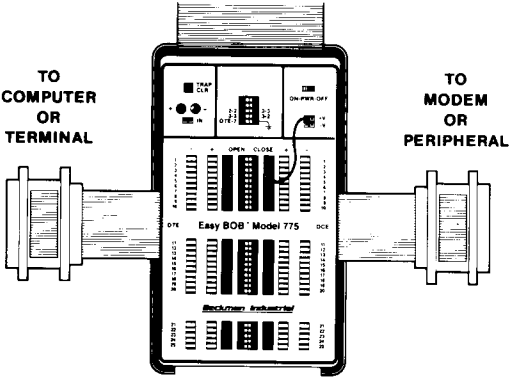
The Model 775 is only a breakout box. It is not designed to be a cable tester but can be used to assure that a good cable is being used.

1. Put all breaker switches in the OPEN position.
2. Attach each end of cable to be tested to each side of Easy BOB.
3. Insert jumper wire into +V or −V terminal below the power switch.
4. Turn on the Easy BOB power.
5. With jumper wire, starting on the DTE side, pin 1, insert the jumper into each line terminal strip location. Please note that the power from the faceplate voltage is what lights the LED and all other LED's connected to that pin. Now do the same thing at DTE, pin 2. Step through the DTE connector pin by pin. After checking each pin on the DTE side start checking the DCE side.

## F. SIMULATION OF SIGNALS

When testing a data transmission network it is rather common to find that a needed signal is not available. For instance, let's assume the computer sent out a Request-to-Send, pin 4, signal but it did not receive back a Clear-to-Send, pin 5, signal. Now, a signal must be simulated on pin 5 to see if the system will start to function properly. Typically, this is a positive voltage (red) signal but the manufacturers manual should be checked. Assuming it is a positive signal needed, use a jumper wire from the +V terminal, near the power switch, to the appropriate pin number jumper terminal, such as pin 5 in this example.

Please note that the terminal strip with the positive and minus voltages available is near the on/off switch. These voltages are most commonly used for signal simulation.




**SIMULATION OF SIGNALS**



## G. CABLE TESTING

The Model 775 is only a breakout box. It is not designed to be a cable tester but can be used to assure that a good cable is being used.

1. Put all breaker switches in the OPEN position.
2. Attach each end of cable to be tested to each side of Easy BOB.
3. Insert jumper wire into +V or −V terminal below the power switch.
4. Turn on the Easy BOB power.
5. With jumper wire, starting on the DTE side, pin 1, insert the jumper into each line terminal strip location. Please note that the power from the faceplate voltage is what lights the LED and all other LED's connected to that pin. Now do the same thing at DTE, pin 2. Step through the DTE connector pin by pin. After checking each pin on the DTE side start checking the DCE side.

H. TROUBLESHOOTING

A breakout box will only test signals on the digital lines of the system. It does not test the analog signals of the telephone lines.

The RS232 interface has 25 pins. Seldom would all 25 pins be used. As few as 2 pins probably 5-8 pins are used but not necessarily the same pins are used. This is what creates many of the problems in a RS232 network. This means that two pieces of equipment using RS232 protcol does not mean they will operate together. This is why the user must have the ability to simulate signals, jumper signals and otherwise "fool" the system into working as a team.

One of the most common problems is the connector. Not that they get corroded, not that they wear—but—because they come unplugged. The problem is that people don't notice that it came unplugged and try everything they can think of except checking the connector.

Everything stops—this usually is an AC or data cable problem. Check that your data cables are plugged in firmly.

Line feeds—if you are getting too many or not enough check the printer setting. It probably got knocked into the wrong setting.

Garbage on CRT or printer—one of several things could be wrong. It probably is in the telephone line or modem. The quality of the telephone line is VERY important. If you get a poor connection, start over. Poor quality lines change the bit pattern, and your CRT displays a $ sign when an "M" was the character transmitted to you.

Modem stays on—a modem has something called "carrier detect". This means it can detect when you are having a telephone call. However, sometimes because of static or whatever, it cannot tell when you have completed the call. Turn the modem switch to off, then on, and hope to get a better telephone line next time.

Intermittent problems—check the cable first, it could be a poor solder connection. This situation could require an Easy BOB on the data line at each end. It is possible that a BERT would be needed if the problem persists.



## GLOSSARY OF TERMS

| | |
|---|---|
| **Acoustic Coupler** | A type of modem that uses a telephone handset. |
| **Analog** | Data in the form of continuously variable physical quantities. Contrast with Digital. Usually telephone line transmission. |
| **ASCII** | American Standard Code for Information Interchange. |
| **Asynchronous Transmission** | Transmission in which one information character at a time is sent or received. |
| **BAUD** | A unit of signaling speed equal to the number of discrete conditions or signals per second of a character. |
| **BERT** | Bit error rate testing, testing a data line with a known bit pattern and is transmitted and then compared when received back to determine errors. |
| **BLERT** | Similar to BERT except that known blocks are transmitted. |
| **CCITT** | International Telegraph and Telephone Consultative Committee. An agency of the United Nations International Telecommunications Union (ITU), Its purpose is to promote compatability between communication practices and performance standards of various nations. |
| **DATEL** | Refers to high quality international circuits. |
| **Digital** | The 0/1 method of coding Alpha/Numeric characters. |
| **EIA** | Electronic Industries Association, defines the RS232 specifications. |
| **Modem** | A contraction of modular-demodulator. A data set that both transmits and receives data, control and clock signals. |
| **RS232** | Interface between data terminal equipment and data communication equipment employing serial binary data interchange (August 1969). Recommended cable length is up to 50 feet. |
| **Synchronous Transmission** | Messages are sent in blocks where all characters are sent continuously. No stop or start bits for each character. Each block starts with a sync character. |

| PIN | NAME | EIA | CCITT | SOURCE DTE | SOURCE DCE | SIGNAL |
|---|---|---|---|---|---|---|
| 1 | PG | AA | 101 | — | — | PROTECTIVE GROUND |
| 2 | TD | BA | 103 | → | | TRANSMIT DATA |
| 3 | RD | BB | 104 | | ← | RECEIVE DATA |
| 4 | RTS | CA | 105 | → | | REQUEST TO SEND |
| 5 | CTS | CB | 106 | | ← | CLEAR TO SEND |
| 6 | DSR | CC | 107 | | ← | DATA SET READY |
| 7 | SG | AB | 102 | — | — | SIGNAL GROUND |
| 8 | DCD | CF | 109 | | ← | DATA CARRIER DETECT |
| 9 | POS | — | | | ← | POSITIVE DC TEST VOLTAGE |
| 10 | NEG | — | — | | ← | NEGATIVE DC TEST VOLTAGE |
| 11 | — | — | — | — | — | UNASSIGNED |
| 12 | SDCD | SCF | 122 | | ← | SECONDARY DATA CARRIER DETECT |
| 13 | SCTS | SCB | 121 | | ← | SECONDARY CLEAR TO SEND |
| 14 | STD | SBA | 112 | → | | SECONDARY TRANSMIT DATA |
| 15 | TC | DB | 114 | | ← | TRANSMIT CLOCK |
| 16 | SRD | SBB | 110 | | ← | SECONDARY RECEIVE DATA |
| 17 | RC | DD | 115 | | ← | RECEIVE CLOCK |
| 18 | — | — | — | — | — | UNASSIGNED |
| 19 | SRTS | SCA | 120 | → | | SECONDARY REQUEST TO SEND |
| 20 | DTP | CD | 109 2 | → | | DATA TERMINAL READY |
| 21 | SQ | CG | 110 | | ← | SIGNAL QUALITY DETECT |
| 22 | RI | CE | 125 | | ← | RING INDICATOR |
| 23 | — | CH CI | 111 112 | → | ← | DATA RATE SELECTOR |
| 24 | SCTE | DA | 113 | → | | SERIAL CLOCK TRANSMIT EXTERNAL |
| 25 | BUSY | — | — | → | | BUSY |



## WARRANTY REGISTRATION CARD

PURCHASED

MONTH DAY YEAR

MODEL NUMBER SERIAL NUMBER

NAME

COMPANY

ADDRESS

CITY

STATE ZIP CODE

AREA CODE TELEPHONE NUMBER EXTENSION

**WHAT TRADE PUBLICATIONS DO YOU READ MOST?**

1. _____

2. _____

3. _____

Comments: _____

_____

_____

_____

Beckman Industrial™

## 1. CONGRATULATIONS

You have the finest quality, professionally designed, test instrument for monitoring RS232/CCITT signals - Easy BOB

This Beckman Industrial Breakout Box will help you interface, troubleshoot, test and gain access to RS232/CCITT signal lines. This Easy BOB product was designed to give you many years of reliable use, but, if anything (anything) happens to it, please send it to Beckman Industrial.

Send to: BECKMAN INDUSTRIAL
3883 Ruffin Road
San Diego, CA 92123-1898
Attn: Customer Service Department

Date Bought: _____

From: _____ Model: _____

Serial Number: _____

# EASY BOB, MODEL 775
# OPERATOR MANUAL
# TABLE OF CONTENTS

# OPERATOR MANUAL

## 2. INTRODUCTION

A. Where, How and Why to use a Breakout Box

Computers and computer related devices such as printers, terminals and modems must "talk" to each other. This is almost always done with some type of cable interfacing the various devices within the system. The users of computer equipment utilizing the RS232/CCITT interface specifications will always find a cable between the various devices.

It is important to remember that a breakout box is an instrument that illuminates LED's when there is a signal present. Some users try to make it more complicated than that. It will allow the user to stop (break) that signal, send it straight through to the adjoining pin or change the signal to another line (pin). Most breakout boxes will indicate positive or negative voltage signals too.

The Easy BOB breakout box is an easy to use data communications test instrument. Simply plug it into the data line, usually between the cable and equipment, and watch the LED's illuminate. If not, change the configuration so that is correct.

The Easy BOB breakout box becomes a valuable tool because the LED's on the faceplate will illuminate when there is a signal on that line/pin. The LED is green for a negative signal (voltage) and red for a positive signal (voltage). The RS232/CCITT signal is between 3 and 25VDC, negative or positive. When the signal must be broken or changed the SLIDE switches can break the signal and the jumper wires used to change the signal from a pin on the breakout box one side of the switches to any pin on the other side of the switches. This is typically the method used when the pin 2, pin 3 crossover is needed.

The pin configuration chart shows each of the 25 RS232/CCITT pins and their definition. Each of these signals will originate from one of the pieces of equipment. These are known as the Data Terminal Equipment (DTE) and Data Communications Equipment (DCE). DTE equipment is typically the computer or terminal while DCE equipment is typically printers and modems. However, there are exceptions that the engineer and technicians must understand. The LEDs on the faceplate of the Easy BOB are on the side of the signal originating equipment. The reason is so that the signal can be broken using the SLIDE switches but the presence of a signal can still be indicated.

The Breakout box is a very important test tool when transmitting and receiving RS232 CCITT data communications signals. It detects, indicates, displays, breaks, changes and analyzes RS232/CCITT signals going between computer related equipment.



B. What the breakout box is not.

A B.O.B. is a detection device; it has no storage capability. It cannot store a message (such as QUICK BROWN FOX), cannot transmit it, and cannot check to see if it was received correctly. A B.O.B. simply detects that on a pin there was a voltage, if so, a light is turned on.

A B.O.B. is not a baud rate tester. It has no way of detecting how fast the data is moving through the wire. It only detects that there is movement.

A B.O.B. is not a telephone or telephone line checker. There is no way to plug the modular jack into the BOB and measure voltage and frequency. You need a telephone checker which will do these and more tests.

A B.O.B. cannot tell you what the actual voltage is. It simply detects and shows via lights if it was plus, minus, or none.

A B.O.B. is not a modem tester. A B.O.B. can do a partial check on modems, but only to the degree that it can detect that signals are going in and out of it to the terminal (or computer).

C. RC232/CCITT Voltages

Per RS232/CCITT specifications all voltage are plus or minus 3 to 25 volts D.C. Breakout boxes are designed to detect the voltage and if between these levels turn on the LED. All signals entering the Easy BOB have a voltage as described above.

D. RS232/CCITT Pin Information

The RS232/CCITT connector has 25 pins. These 25 pins each have a specific purpose, but are divided into two groups.

1. Primary Pins - Used for asynchronous data (transmit one character at a time, which is most common) and slow speed transmission (less that 2400 characters/second). This is about 80 percent of all the RS232/CCITT used.

**12 PRIMARY PINS-FOR ASYNCHRONOUS TRANSMISSION**

Ground - pin 1, 7

Data - pin 2, 3

Control - pin 4, 5, 6, 8, 20, 21, 22, 23

2. Secondary pins - Used for synchronous data (transmitted a paragraph at a time) and high speed transmission. For instance, pin 2 is transmit data, so is pin 14. The computer receives data on both pins and compares. If it matches, it accepts it. If it doesn't match, it requests a retransmission, which could be requested several times for each block (paragraph) of data.

**SECONDARY PINS-FOR SYNCHRONOUS AND HIGH SPEED TRANSMISSION**

Timing - pin 15, 17, 24

Secondary Data - pin 14, 16 (redundant of pin 2, 3)

Secondary Control - pin 9, 10, 11, 12, 13, 18, 19, 25

The user does not need to memorize the function of each pin, but should have a working knowledge of the primary pins. The majority of systems will use only some of these pins. It is common to see systems using no more than pins 2, 3, 4, 5, 6, 7, 8 and 20. A system could use only pins 2 and 7 if it was a transmit data only type. Manuals should always be reviewed to be sure which pins are required for the specific equipment.



## 3. GETTING TO KNOW EASY BOB

The Easy BOB breakout box was designed to give many years of reliable use. It's housed in a rugged high impact case that can take the "tool case" abuse. It offers quality and unique features that makes it the easiest to use while offering the best value.

Carefully read this manual so you, the user, can get a full appreciation for Easy BOB.

### A. ON/OFF POWER SWITCH

Located in the upper right hand corner of the unit. When the switch is in the left hand position the unit is ON. This applies plus and minus voltage to the unit from the two 9V batteries located in the lower battery compartment.

### B. FACEPLATE VOLTAGE

Located directly under the power switch is the terminal strip for the plus and minus voltage. This is 9V voltage because it is supplied by the two 9V batteries housed in the unit. The main use of faceplate voltage is to simulate signals. If the user wants to simulate a Clear to Send signal on pin 5 they could jump from minus voltage to pin 5.

### C. DTE/DCE SIDES

There is a ribbon cable with a connector on each side of the Easy BOB breakout box. On the faceplate of the breakout box DTE is printed on the left side, DCE on the right side. The Easy BOB breakout box should be connected so that the DTE connector on Easy BOB connects to the Data Terminal Equipment and the connector on the DCE side connects to the Data Communications Equipment. Usually one of these sides will connect to a cable which connects to the equipment.

DTE is the abbreviation for Data Terminal Equipment, DCE is Data Communications equipment. DTE equipment would be the computer while the DCE would be the printer, terminal or, maybe, disk drive. A modem would be considered a DCE device. The user should review data communications text books on this subject, there are exceptions to this basic explanation.

When examining the signals on various pins the user will see that these signals will originate on the DTE side or the DCE side. For instance, pin 2, Transmit Data, originates on the DTE side, while, pin 5, Clear to Send originates on the DCE side.

## D. SWITCHES

1. SWITCHES, LINE

Each of the 25 lines monitored by the Easy BOB breakout box can be broken, if desired, by a flip of the SLIDE switch. These switches are in three groups located at the center of the faceplate. There are two groups of 10 and one set of 5 switches. When the switches are in the OPEN position the signal is broken and does not pass through the BOB. When any of the 25 switches are in the closed position the signal will pass from one side of the BOB to the other side.

2. SWITCHES, SPECIAL

Near the top of the faceplate are SLIDE switches used for special purposes.

a. DTE to Ground

The Easy BOB breakout box can be used for two purposes. One is the standard RS232 mode where pin 7 is signal ground. The SLIDE switch would be pressed to the right side (ground symbol) for this mode of operation.

The purpose of a full (all 25 lines monitored) breakout box is to monitor special interfaces. Some of these special interfaces may NOT use pin 7 as signal ground. These interfaces need to have pin 7 look like any of the other pins. When the SLIDE switch is pressed to the left side it looks like the other pins. For instance, if you wanted to monitor the IBM parallel output on the DB25 connector the SLIDE switch would be pressed to the left side.

b. Pin 2/3 Crossover

Many times the signal needs to have the pin 2 and 3 crossover. This can be done with a flip of these two switches. When these two switches are pressed to the left, pin 2 on the DTE side goes to pin 2 on the DCE side. Pin 3 on the DTE side goes to pin 3 on the DTE side.

When the switches are pressed to the right side pin 2 on the DTE side is connected to pin 3 on the DCE side. Pin 3 on the DTE side is connected to pin 3 on the DCE side.

This is a common situation in data communications so the switches are used instead of using jumpers (jumpers would be an optional method) to save the user time and effort.



## E. JUMPER WIRE AND TERMINAL STRIPS

On each side of the SLIDE switches in the center of Easy BOB are jumper wire terminal strips. For each pin location on both sides there are two jumper wire jacks. This allows the user the flexibility of using standard 22 gauge (.026") solid wire to jumper signals from one pin location to another pin location such as the pin 2 to pin 3 crossover. There are jumper wire jacks for all 25 pin locations.

By using standard 22 gauge solid wire additional jumpers can be made easily as needed. Another feature is that it makes access to any of the 25 lines easy. The technicians or engineers wanting to measure the exact voltage with a digital multimeter or see the signal on an oscilloscope has easy access to the signal.

When there is a special situation in which a signal might need to be jumpered from the BOB to a modem, terminal or whatever, a standard piece of 22 gauge wire can be used, whatever reasonable length needed.

## F. LED's

On each side of the break switches are monitor points for the 25 RS232 (CCITT V.24) lines. The Model 775 has red and green LED's for all lines (50 monitor locations). There are several advantages but the main advantage is that the user can see signals coming into Easy BOB and see the signals going out of Easy BOB. This is especially useful when signals are jumpered from one line to another line. Another situation where it is useful is when jumpering the pin 2 to 3 swap.

The red LED will illuminate when there is a plus voltage of 3 to 25 VDC. The green LED will illuminate when there is a minus voltage of 3 to 25 VDC.

An additional feature of the Model 775 is the capability to test cables. Only the red LED's are used when testing cables. For details on how to use the Easy BOB Model 775 as a cable tester see the Cable Tester section in this manual.

For information on the Pulse Trap LED's see the Pulse Trap explanation in this section.

## G. RIBBON CABLE AND CONNECTORS

The Easy BOB must be connected to the data transmission network. This is usually done by disconnecting one end of the cable, plugging the Easy BOB into that equipment port and plugging the cable into the other side of the breakout box. Now, all signals will go through the breakout box.

Without having a ribbon cable on the connector it would usually be impossible to connect the breakout box to the equipment. The Easy BOB breakout box has ribbon cables on both sides so that it can easily be connected to the DTE side or the DCE side as needed. In this way the user is not restricted as to what side must be connected.

The connectors on the ribbon cables are dual gender. This means that each connector has a male and a female side. Many times a breakout box is inserted into the line only to find out the user is trying to connect two females or two male connectors. The user then hopes there is a gender changer adapter handy. With dual gender connectors it makes no difference, a male or female connector will plug into either side of the breakout box. This offers convenience, less equipment to carry and saves significant time.

## H. PULSE TRAP

The Easy BOB breakout box is equipped with a Pulse Trap. The Pulse Trap is used to detect very short duration changes in the line monitored.

These changes in the line could be on a line that should have no signal but one appears on the line. It will also monitor lines that should have a signal but suddenly loses it. On a line with no signal but one suddenly appears the green (space) LED will illuminate. On a line that should have a signal but loses it, the red (mark) LED will illuminate. These changes can be as short as 1 microsecond. The signal could be of virtually any length.



## I. PIN CONFIGURATION IDENTIFICATION, RS232

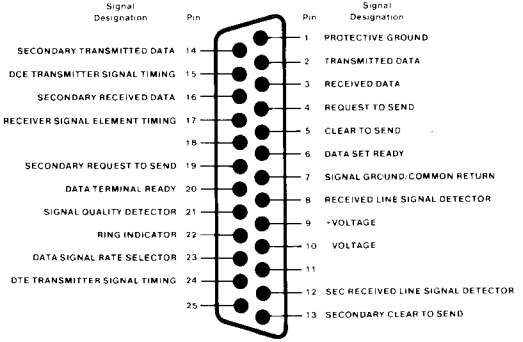
The RS232 connector has 25 pins. It is the DB25 connector. Each pin has a specific purpose although there are no specifications on how many of the pins must be used. The decision is made by the manufacturer of the product.

The RS232 pins are divided into two groups:

1. Primary group - for slow speed, asynchronous transmission
Ground - Pin 1, 7
Data - Pin 2, 3
Control - Pin 4, 5, 6, 8, 20, 21, 22, 23

2. Secondary group - for high speed, synchronous transmission
Timing - Pin 15, 17, 24
Secondary Data - Pin 14, 16
Secondary Control - Pin 9, 10, 11, 12, 18, 19, 25

RS232 INTERFACE



## J. POWER, BATTERY

Your Easy BOB uses two 9 VDC batteries. One battery furnishes positive voltage while the other battery furnishes negative voltage. This battery power is used for the high impedance circuitry and to furnish the face-plate voltage. With the power switches in the ON position it turns on both the positive and negative battery voltage. Battery drain, when switched ON, but not in use, is virtually zero.

The life of the battery will depend on the type of usage but is rated at giving 200 to 2000 hours of use.

If Easy BOB is to be in an active data transmission line for an extended period of time it is recommended that the unit be turned OFF. The signals will still flow through Easy BOB but the circuitry will not detect signals and illuminate LED's. The user by looking at the LED might see a glow showing that there are signals on the lines.

The battery compartment is located in the bottom, rear of the unit. The battery hatch can be removed with one screw then slipped to the side. There are two 9V DC batteries located inside.

Self powered Easy BOB's have two advantages. It allows the Easy BOB to have high impedance circuits that detects the data/control signals, lights the LED's,but does not degrade the actual signal. It allows for extra sensitivity to detect crosstalk and noise along with the normal logic levels.

## K. TOUGHPACK CASE

The case of your Easy BOB is made from rugged, high impact plastic. It is the type that takes a lot of punishment.

Sometimes an extra measure of protection is desired. A tough vinyl case, VC700-1 is available for Easy BOB. It is attached in the case and has a pocket to hold jumpers and the Operator manual.



## L . ACCESSORIES

There are several other Beckman Industrial products that might be used in conjunction with the Easy BOB breakout box.

1. VC 700-1: Vinyl case, this case will hold the Easy BOB
2. VC 700-2; Vinyl case to hold the Model 703 modules
3. Patch boxes, Model 701, 702, 703

When these products are used with Easy BOB it would be to adapt one type of cable connector to the DB25 connector on the unit. This would allow data lines of other types and other types of cables to be tested on Beckman Industrial products. For example, a cable with a DB25 connector on one end and a 36 pin Centronics connector on the other end can be checked with a Model 785, Easy BOB cable tester, and a Patch Box to adapt the Centronics connector.

4. Jumper wires Model JW-10

Replacement jumper wires can be ordered from Beckman Industrial.

## M. SPECIFICATIONS

1. Input/Output Connectors
2. LED's-100 LED's, (50 red, 50 green)plus the red and green Pulse Trap LED's.
3. Switches-There are 25 in-line SLIDE switches so that the signal can be broken on any line
4. Terminal, jumper-This jumper terminal is designed to use 22 gauge solid wire. The user can use a variety of wire lengths if needed. This can be especially valuable for special applications. There are two jumper locations on each side of the switches per pin. This allows jumpering from pin to pin or an excess port to monitor a line with a DMM or oscilloscope.
5. Voltage-powered by two 9V batteries, one used for positive voltage, the other used for minus voltage.
6. Size-3 5/8 x 2 3/16 x 6
7. Weight-.7 lb.

## OPERATING INSTRUCTIONS

A. GENERAL INFORMATION

The Easy BOB breakout box allows the user to insert the BOB into the data transmission line so that all data and control signals flow through it. The powered BOB's will not degrade the signal while the unpowered BOB's will draw current from the line voltage to illuminate the LED's. The user must decide which type is best for the application.

B. BEFORE YOU START

The user should take time to get familiar with the features of the breakout box and better understand its capabilities. Before getting familiar with how to use it. The user should read about the many features and capabilities in the "Getting to Know Easy Bob" section of this manual.

There are some tests to assure the Easy BOB is working properly and to help the user get familiar with the unit.

1. LED test-switches open

The switch open position means the signal can not pass through the switch. Put all SLIDE switches in the open position. Using a jumper wire from the positive or negative faceplate voltage, insert it in each line position, that has an LED associated with it, of the jumper terminal strip. The LED on the side you insert the jumper should illuminate. Now insert it in the same pin number terminals on the other side of the SLIDE switches. The LED should not light on the opposite side of the SLIDE switches.

2. LED test-switches open, connector connected

Put all SLIDE switches in the OPEN position attach the dual gender connectors from each side together. This means that signals can not pass through the BOB to the other side but can pass through the connected connectors to the other side. Using a jumper wire, insert on end into the faceplate voltage (+ or −), then insert the other end into the jumper terminal of each of the 25 lines. The LED's on both sides should illuminate.

3. LED test-switches closed

The switch closed position will allow signals to pass from one side of Easy BOB to the other side of Easy BOB. Put all SLIDE switches in the center of the BOB in the closed position. Do not have the connectors attached. Using a jumper wire, insert one end into either the positive or negative side of the faceplate voltage. Insert the other end in each of the 25 positions of the jumper terminal strip next to the SLIDE switches. LED's on either side of the switch should illuminate. Change to the other voltage, repeat the test and see if you get the same results.

NOTE: When testing LED's from faceplate voltage, pin 7 LEDS's will not illuminate when it is the Signal Ground Position.



4. REVERSE PIN 2 AND PIN 3

Transmit data is always pin 2, receive data is always pin 3 so in systems such as computer going directly to printer, a crossover may be needed.

A. OPEN the SLIDE switch (break the line) for pin 2 and 3.

B. Insert jumper from DTE pin 2 to DCE pin 3.

C. Insert jumper from DTE pin 3 to DCE pin 2.

Using a jumper wire from faceplate voltage test to assure signals go from pin 2 to pin 3 and not straight through the box such as pin 2 to pin 2.

5.JUMPER SIGNALS AND SIGNAL SIMULATION

A. Jumper Wires

Let's imagine that you have and IBM-PC and you want to interface it to a NEC Spinwriter printer. The problem is that the only cable you have is a ribbon cable which means pin 2 to pin 2, pin 3 to pin 3, etc. Here is how you can use Easy BOB to reconfigure the cable and get the IBM to work with the NEC.

Your Easy BOB breakout box can be placed next to the IBM-PC or the NEC printer. With the Easy BOB in the system all signals between the two pieces of equipment will go through the Easy BOB. To break the signal from passing through the Easy BOB place the breaker (SLIDE) switches in the OPEN position. The switch position for only pin 1 (earth ground) and pin 7 (signal ground) should always be in the CLOSED position.

Jumper wires will be placed in the Easy BOB terminal strips to change signals from one pin to another pin.

Follow these steps:

1. Place a jumper wire from the IBM side pin 2 (TD) to the NEC side pin 3 (RD).

2. Place a jumper wire from the NEC side pin 4 (RTS) to the NEC side pin 5 (CTS).

3. Place jumper wires from NEC side pin 6 (DSR) to NEC side pin 8 (DCD) to NEC side pin 20 (DTR).

4. Place jumper wires from IBM side pin 4 (RTS) to IBM side pin 5 (CTS) to IBM side pin 6 (DSR) to IBM side pin 20 (DTR) to NEC side pin 19 (SRTS).

Place one end of a jumper wire in the faceplate voltage terminal strip. Place the other end of the jumper wire in each of the above mentioned pins terminal strips. This voltage will light up the LED's to show if the connections are correct. If correct, the IBM-PC and the NEC Spinwriter printer will work together.

B. SIGNAL SIMULATION

In the above jumper wire set-up for the IBM-PC lets assume it was not outputting a signal on pin 4, Request-to-Send. This signal is also needed to drive pin 5, Clear-to-Send, pin 6, Data Set ready and pin 20, Data Terminal Ready. Since this computer set-up is a direct connection from computer to printer there is not a clear-to-send from the printer or data sets or terminals available that can give a reply back to the computer. The jumpers are used to "fool" the computer. If there was no Request-to-Send signal. no signals would be output and the printer would not operate. The user would need to simulate a Request-to-Send signal. This would be done by attaching a jumper wire from the plus voltage terminal on the faceplate voltage to pin 4, Request-to-Send. If the faceplate voltage was jumpered to pin 5, a clear to send signal would be simulated. This same simulated voltage situation might apply to any line. Request-to-Send and Clear-to-Send was used in this explanation because they are more common.

The actual voltage needed, plus or minus, and the actual pins needed for a configuration would be found in the manufacturers equipment manual.

C. INSERTING EASY BOB IN TO THE DATA NETWORK

Typically, there is a cable between two pieces of equipment such as computer to printer, computer to modem, terminal to modem or whatever. It makes little difference if the Easy BOB is inserted next to the DTE equipment or the DCE equipment. It usually depends on which end has the easiest access. Check to see that all equipment has been turned off. It is usually a good idea to check the cable with a cable tester to assure it has been and still is configured to the proper specifications. Many hours have been saved with this initial test step.

The Easy BOB has dual gender cable connection on both the DTE side and the DCE side so that it can be inserted between the cable and the equipment at either end such as computer or modem. Connect Easy BOB to one of the pieces of equipment. Use the same port (connector) as the cable would use. Now plug the cable into the other side of the breakout box and to the equipment at the other end. The Easy BOB has dual gender connectors so it can connect to a male or female connector on the computer or cable or other equipment.



## 5. APPLICATIONS/TROUBLE SHOOTING

A large majority of the interface testing situations are very straight forward. There is a signal going from the DTE equipment to the DCE equipment, and, vice versa.

Usually there are manuals or other documentation that gives information on what pins are used by that equipment. The technician or engineer will use the breakout box to see if the computer sent a Request-to-Send,etc.

However, other than standard situations do exist and must be tested. This section describes some of those situations to help the user get more familiar with the Easy BOB. There are several purposes for using Easy BOB, obviously not limited by what is described here, only limited by the users imagination.

A. BREAKOUT BOX APPLICATIONS

A breakout box can be used for several purposes. Any application where you want to detect if there is a voltage of either +3 to +25 or −3 to −25 D.C. Volts is probably a BOB application. The various signals in a RS232 data communications cable have these voltages.

One of the most common uses of a Breakout Box is to see if signals are being sent and received. Another application of a BOB is to use it to check cables. You can test each individual line (pin) to see which pin is connected to what other pins in the connector.

COMMON BOB APPLICATIONS

1. Signal Test—Detects the signal voltage on each line and displays a red or green light.

2. Line Attenuation Test—determines if voltages are within proper ranges.

3. Modem Loop-Back—loops the received signal, usually pin 3, and loops it back onto the transmit side, pin 2.

4. Line Transition—the change in line state by switching from one color LED to the other color.

5. Nonstandard Interface—the jumper wires allow any pin to be connected to any other pin. The SLIDE switches would be in the open position. This is specially needed in direct interface from computers to printers.

As can be seen, any time data is moving from point A to Point B, there is a potential need to look at that activity. Possibly more important is to look at the control signals such as "Clear to Send" and "Request to Send" which allow the data to transmit from one location to the other. The Breakout Box will monitor those signals, illuminate LED's and visually show the interface between devices.